

**Amendments to the Drawings:**

There are no changes to the drawings.

### **REMARKS/ARGUMENTS**

The Office Action of February 17, 2009, stated that, the 2<sup>nd</sup> RCE filed in this application was accepted and the amendment of December 30, 2008 has been entered. An interpretation of Claim 40 is stated. Claims 24, 29, and 34-40 are rejected as not in compliance with 35 USC § 112, 2<sup>nd</sup> paragraph, because these claims are alleged to be indefinite and fail to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Particularly, Claim 24 is rejected because “the limitation that the metallic glass is at least partially amorphous fails to further limit the subject matter of an independent claim because the term “metallic glass” is synonymous with the term “amorphous metal”; and Claims 29 and 34 are directed to a “method” but these claims and those dependent from them do not recite any “steps” to be performed in the method. Claims 1-6, 9, 11-15, 28, 30, 31 & 34-40 are rejected under 35 USC § 103(a) as obvious from Gu (originally cited by applicants in an IDS of 06 Apr 2004). Applicants respectfully traverse each objection to the specification and each rejection of the claims. The Examiner has indicated that Claims 16-23, 25-27, 32 and 33 are allowable over the prior art of record and that Claim 24 would be allowable if re-written to overcome the rejection under § 112 and Claims 7,8 and 10 are objected to as being dependent from a rejected base claim but would be allowable if re-written in independent form.

An interpretation of Claim 40 is stated. Applicants have removed the word “preferably”. The claim is intended to be limited to the alloy described.

Claims 24, 29, and 34-40 are rejected as not in compliance with 35 USC § 112, 2<sup>nd</sup> paragraph, by being indefinite and failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants respectfully traverse this rejection.

Particularly, Claim 24 is rejected because “the limitation that the metallic glass is at least partially amorphous fails to further limit the subject matter of an independent claim because the term “metallic glass” is synonymous with the term “amorphous metal”. Applicants have revised the wording of this claim to make clear that the alloy is at least partially amorphous. This is recognition that the alloy does not have

to be all a “glass”, but could be another form of the alloy. The essence of the invention is the particular formulation of the alloy. It is believed the claim is now fully in compliance with 35 USC § 112.

..... Claims 29 and 34 are directed to a “method” but these claims and those dependent from them do not recite any “steps” to be performed in the method. Applicants have added language based on the specific examples that recite the steps of “forming” the alloy by “heating the materials until an alloy is formed.” These claims should now be in condition for allowance.

Claims 1-6, 9, 11-15, 28, 30, 31 & 34-40 are rejected under 35 USC § 103(a) as obvious from Gu (originally cited by applicants in an IDS of 06 Apr 2004). Applicants respectfully traverse each rejection of the claims. The Examiner states that the 1<sup>st</sup> 132 Affidavit, (as distinguish from the 2<sup>nd</sup> 132 Affidavit submitted in further support of patentability) does not show an unexpected result because “...the only evidence of record ...is not commensurate in scope with the invention as defined in the rejected claims...” (Office Action Page 4). The Examiner does not show any factual evidence. Applicants believe this is an incorrect test. The correct test is the 132 Declaration should be of the same scope as the cited reference, *In re Dillon*, 16 USPQ2d 1897 (Fed. Cir. 1990). The claimed invention can be broader than both. Here, Applicant has shown that there is a distinct and patentable difference between the Gu materials and the instant materials. The results are unexpected when the hafnium material is used alone instead of in combination with zirconium.

Gu fabricated a series of alloys with the formula  $(\text{Hf}_{1-x})_{52.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$ , comprising of six elements of Hafnium, Zirconium, Copper, Nickel, Aluminum, and Titanium. As such, the resultant metallic glass is a six-component or senary alloy. This is unlike the five-component, quinary alloy described in the instant claims. The examiner argues that saturation of the Vitreloy105 composition with Hafnium, i.e., setting  $x=0.8$  results in an alloy that has approximately the same composition and density as that in the instant claims. Dilution of a Hafnium alloy with Zirconium rapidly reduces its density as indicated in Table 1. From the table, it is obvious that Gu alloys with compositions of  $0.9 \geq x \geq 0.8$  do not have the density of the alloy in the instant claim.

Likewise, the instant claim is for the family of alloys of  $\text{Hf}_x\text{Cu}_y\text{Ni}_z\text{Al}_a\text{Y}_c$ , wherein Y is a single element from Groups IVA, IVB, VA, or VB. As such, only Ti, Zr, Hf, V, Nb, or Ta could be included. To obtain the Gu alloy, both Zr and Ti would be needed, but the instant claim, per amendment Dated 30 October 2008, allows only for one or the other, but not both.

**Table 1. Density Variation of the Senary Vitreloy105 Alloy Series**

X	Gu Alloy Series ( $\text{Hf}_{52.5}\text{Zr}_{1.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$ )	ROM Density ( $\text{g/cm}^3$ )	Present Invention	ROM Density ( $\text{g/cm}^3$ )
1	$\text{Hf}_{52.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	10.872	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0.9	$\text{Hf}_{47.25}\text{Zr}_{5.25}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	10.432	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0.85	$\text{Hf}_{44.625}\text{Zr}_{7.875}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	10.212	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0.8	$\text{Hf}_{42.0}\text{Zr}_{10.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	9.993	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0.6	$\text{Hf}_{31.5}\text{Zr}_{21.0}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	9.120	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0.4	$\text{Hf}_{21.0}\text{Zr}_{31.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	7.883	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0.2	$\text{Hf}_{10.5}\text{Zr}_{42.0}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	7.396	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535
0	$\text{Zr}_{52.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$	6.544	$\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$	10.535

The above chart and the 2<sup>nd</sup> 132 Declaration attached show factually that the suppositions in the rejection are not supported by the facts. It is believed the claims, as amended, are in condition for allowance and a favorable action is requested.

The Examiner has indicated that Claims 16-23, 25-27, 32 and 33 are allowable over the prior art of record and that Claim 24 would be allowable if re-written to overcome the rejection under § 112. The Examiner is thanked for this indication. Changes have been made to several claims that are believed to bring the claims, including Claim 24, within the intent of 35 USC § 112 so these claims are now in condition for allowance.

Claims 7, 8 and 10 are objected to as being dependent from a rejected base claim but would be allowable if re-written in independent form. Applicants acknowledge the Examiner's comments and have made suitable amendment to these claims 7, 8 and 10 so

that the claims from which they depend and these claims are now in condition for allowance.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case. The Director is hereby authorized to charge any additional fees or underpayments under 37 C.F.R. § 1.16 & 1.17; and credit any overpayments to Deposit Account No. **19-2201** held in the name of U.S. Army Materiel Command.

Respectfully submitted,  
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Attachments:  
2<sup>nd</sup> 132 Declaration of Laszlo Kecskes